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ABSTRACT

An examination of the effects of collaborative interaction among 13 elementary school teachers implementing an innovative teaching approach collected data pertaining to the subjects' interdependence and lateral communication from teachers' responses to questionnaires answered at 2-week intervals throughout a school year. Data for measuring teacher implementation of the curriculum was drawn from 20 structured, 10-minute observations of each teacher. Field observation and structured and semi-structured interviews were also used as measures. Results showed that the number of times teachers met with their colleagues, assistants, principals, and supportive supervisors was unrelated to implementation. Lateral communication positively correlated with the quality of implementation only when teachers gave their assistants structured feedback or used an agenda checklist for meetings. Structured feedback given to teachers by supportive supervisors was highly correlated with quality of implementation. The study concluded that the most powerful strategy for raising the quality of implementation is regular, structured, specific feedback given to the teacher by a supportive supervisor for at least a year following initial training. (Author/CB)

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FOCUSED TEACHER INTERACTION FOR SUCCESSFUL CHANGE

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Introduction. The main goal in this study is to examine the effects of collaborative interaction among teachers upon their implementation of an innovative teaching approach. The rationale for this study rests on the issue of uncertainty surrounding the technical task of implementing a complex innovation. I argue two points. First, collaborative interaction is an effective strategy for reducing uncertainty which teachers experience when a new or complex educational program is introduced. Second, I argue that the reduction of uncertainty results in improved implementation of that program.

Implementation can be evaluated along two dimensions: quality and quantity. Quality of implementation is the extent to which the teacher engages in non-routine teaching behaviors mandated by the program. Although quality of implementation is the main focus of this study, I examine quantity of implementation as well. Quantity of implementation is productivity, or the number of activities presented to students.

Conceptual Framework. Organizational theory offers a perspective for understanding why colleagial interaction promotes implementation of innovations in complex environments. C. Perrow (1970) claims that realization of organizational goals depends upon the organization's capacity to process information. That capacity depends upon

the match between management style and complexity of the technology and raw material. As technology becomes less routine and as raw material becomes less well understood, less predictable, and less uniform; then interdependence of groups becomes greater. Unless there is a shift from direct authority in routine, less complex tasks in organizational environments to an increase in the use of lateral relations for communication channels in more complex, non-routine tasks in organizational environments, organizational effectiveness will suffer.

J. Galbraith (1973) explains that the organization can emphasize one of two main design strategies that increase the organization's capacity to handle information: it can invest in vertical information systems or it can employ lateral decision processes which cut across lines of authority. Lateral relations require cooperative behaviors and collaboration. One form of lateral relations is the team, where a group of workers can pool ideas. In teams, people often solve problems themselves rather than referring them upward to supervisors. Galbraith argues that, by increasing the use of lateral relations in an organization, more information can be processed at lower levels and the amount of information to be processed at the top level of the organization can be controlled. The top level can thereby avoid an information overload, while information remains accessible to workers.

Schools are organizations that deal with changing people. People as raw materials are unpredictable and non-uniform. The technology of the school is defined as the way instruction is carried out. Inherently complex technologies in schools involve a variety of instructional materials (not merely paper and pencil) and several kinds of activities carried on simultaneously by students working in diverse groups.

In this study the instructional technology is complex for three reasons. First, the instructional program requires students to use a variety of materials including magnets, batteries, wires, light bulbs, and the like. Second, the program requires students to work in small groups on a variety of different science and math problems simultaneously. Third, teachers are asked to carry out non-routine behaviors, such as giving specific feedback to students.

The research question. Theoretically, the more teacher uncertainty is reduced, the more superior implementation will be. The main set of hypotheses tests the prediction that; given a complex curriculum, the greater the frequency of teachers' structured interaction with teaching colleagues, assistants, and supportive supervisors concerning topics dealing with the curriculum program, the

more superior will be the teachers' implementation of that curriculum program. In the particular curriculum program studied here, superior implementation is seen when teachers give specific feedback to students, talk about multiple abilities, talk about thinking, and extend activities frequently. Inferior implementation is seen when teachers attempt to solve many of the students' problems for them (instead of letting them solve the problems themselves), discipline students frequently, and ask students an excessively large number of questions. A secondary hypothesis tests the prediction that logistical support for materials, scheduled time, and adequate space will be positively correlated with the number of curriculum units taught by the teacher during a school year.

Methodology. Participants in the study were thirteen teachers from five elementary schools in three school districts in the San Francisco Bay Area. The teachers volunteered to learn and implement a complex, innovative instructional program during one school year. Principals at the schools agreed to support the program. The instructional program used for this study is a science/math program called Finding out/Descubrimiento, developed primarily for bilingual Spanish/English classrooms by E. DeAvila and S. Duncan (1982). Each teacher in the study had a trained assistant in the classroom whenever they used the program.

Data concerning teachers' interdependence and lateral communication with colleagues, assistants, principals, and supportive supervisors comes from teacher self-reports on eight questionnaires answered by each teacher at two-week intervals. Data for measuring teacher implementation of the curriculum was drawn from approximately twenty structured, ten-minute observations of each teacher. Extensive field observations and structured and semi-structured interviews supplement the quantitative measures.

The main approach to analysis of the data is correlational. Because the number of subjects is small, the Spearman Rank Order Correlation formula is employed. Unstructured observations and field notes are used to interpret and illustrate statistical results. Four brief case studies of teachers in contrasting school settings provide material for interpretation of conclusions drawn from the statistical analysis.

Results. Results showed that the number of times teachers met with their colleagues, assistants, principals, and supportive supervisors was unrelated to implementation. Only when teachers gave their assistants structured feedback, and/or used an agenda checklist to focus their discussion on topics that were related to more difficult aspects of the program, was lateral communication positively correlated with the quality of implementation (Table 1).

Structured feedback given to teachers by supportive supervisors (consultants from Stanford University) was highly correlated with quality of implementation. Logistical support from the school and district level was significantly correlated in a positive direction with the extent of implementation ($p <= .005$). Field observations showed that many of the discussions by teachers with their assistants concerned superficial topics, such as the gathering and organization of materials, and that many of those discussions did not cover topics that dealt with more non-routine areas of implementation. When teachers used an agenda checklist for conducting their meetings, they said the checklist kept them organized and helped them focus on important issues. Structured observations and feedback given to assistants by teachers were quite rare. Many of the assistants were perceived by teachers to be resistant to feedback regarding their instructional behaviors. Furthermore, it was difficult for teachers to find time to meet with their assistants because time was not provided in their schedules.

Table 1

Spearman Correlation Coefficients of Teachers' Average Rates of Discussion with assistants about Non-Routine Topics, Use of Structured Lateral Communication, and Combined Index of Structured Lateral Communication about Non-Routine Topics with Average Rates of Non-Routine and Routine Teaching Behaviors.

Lateral Communication	Teaching Behaviors			
	Non-Routine Index		Routine Facilitation	
	LC	O/W	LC	O/W
Non-Routine Topics	.157	.105	-.474	-.048
Structured Lateral Communication	.189	.548*	-.606*	-.367
Combined Index of Structured Lateral Communication about Non-Routine Topics	.272	.648*	-.654*	-.330
Supportive Supervision	.523*	.719**	-.780**	-.770**

* p <= .050

** p <= .010

Note: LC represents the situation when students were involved in activities in small groups at learning centers. O/W represents the situation when teachers addressed the whole class during orientation and wrapup.

Interpretation. Results of this study did not strongly support the specific propositions regarding interdependence and lateral communication, derived from a conceptual framework based on organizational sociology. The strong relationship between supportive supervision and non-routine teaching behaviors was entangled with the strong relationship between structured lateral communication and non-routine teaching behaviors. One way to interpret this finding is that it was a product of the first year of implementation, when teachers were dependent on expert supportive supervisors for "learning the rules of the game". During the first year of implementation, it is possible that teachers may not have had the expertise required for modeling new behaviors for their assistants. Lateral communication might be more important in a second year of implementation, when the teachers have become "experts" in their schools and will help other teachers and assistants who are interested in learning the system.

Another interpretation of the strength of the supportive supervision as compared to the strength of structured lateral communication is that, from a social psychological point of view, the conditions for learning were more closely approximated during the feedback sessions provided by supportive supervisors than during sessions between teachers and assistants. A. Bandura (1977) argues from a social psychological point of view, that the learner obtains the

highest level of observational learning when she first organizes and rehearses a modeled behavior symbolically and then enacts it overtly. The teachers participating in this study organized and rehearsed non-routine behaviors most effectively in sessions with the supportive supervisor. In sessions with their assistants, the assistants were sometimes resistant to being observed and sometimes reluctant to receiving direct, specific feedback.

Research implications. Further research is needed to explore relationships between measures of structured lateral communication and measures of implementation. Comparison between a baseline of rates of teaching behaviors at the beginnng of implementation and rates of teaching behaviors at the end of the school year would yield information regarding teachers' improvement in relation to interdependence and lateral communication during implementation.

Longitudinal studies, over a period of years, could be informative regarding long-term relationships of lateral communication with the more difficult aspects of non-routine teaching behaviors in complex settings. Relationships between changes observed after the first year of implementation, over time, and rates of structured lateral communication could yield more confidence in the efficacy of lateral communication for improving implementation. To

disentangle effects of structured lateral communication from supportive supervision researchers might give some teachers supportive supervision on their teaching behaviors and might give others a different kind of support for participating in structured lateral communication. The number of subjects in the present study is so small the one cannot be sure that the interesting associations between structured lateral communication and teaching behaviors would be replicated in another study.

Practical implications. When a curriculum is complex, superior quality of implementation by teachers is probably related to the frequency with which teachers communicate laterally with assistants and colleagues in structured ways that focus upon non-routine aspects of the program. However, the most powerful strategy for raising the quality of implementation is regular, structured, specific feedback given to the teacher by a supportive supervisor for at least a year following initial training. It is the school's or district's responsibility to provide scheduled time for teachers and assistants to meet for this purpose. Feedback by supportive supervisors to teachers and feedback by teachers to their assistants should be structured and specific and should be based upon observations with criteria fully understood by persons observed. Implementation of a complex program probably requires logistical support for curriculum materials, classroom space, space for storage of

materials, and time for teachers or others to organize those materials.

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